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# WHAT IS THE EFFECT OF REMOVING RATING-BASED REGULATION?

# EVIDENCE FROM MONEY MARKET FUNDS

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## Abstract

This paper studies the effect of removing rating-based regulation, using as case of study the SEC removal of certain references to credit ratings in money market funds' legislation. By making use of linear regression models, the funds' asset allocation preferences were studied for the period surrounding the law amendments. The evidence suggests that the law amendments produced effects at an early stage. Additionally, the effects resulted in a movement towards securities perceived in the market as safer and a decreasing gap between the asset allocation preferences of prime and taxable money market fund types.



**Keywords:** Debt Market; Money Market Funds; Regulation; Credit Ratings; Asset Allocation

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## 1. Introduction

Money market funds are mutual funds that invest in very liquid securities with a short amount of time until maturity. Those securities generally include highly rated cash and cash equivalents, corporate and government bonds. Being characterised by offering investors low risk and high liquidity, money market funds "intermediate short-term credit flows and perform a crucial function in the shadow banking system" (Baghai, Giannetti and Jäger 2020).

Motivated by the 2008 financial crises, the Dodd-Frank Wall Street Reform and Consumer Protection Act was passed in 2010. On the aftermath of the 2008 financial crises, after many securities turning-out to present a risk profile worse than it was expected for their rating class, it became clear that the market participants and regulators heavy-reliance on credit ratings as measure to assess credit risk could constitute a source of systematic and even systemic risk (Sangiorgi and Spatt 2017). With the objective of counteract these issues, the Dodd-Frank act has a section dedicated to the pull back of the regulatory use of ratings. Complying with the act, the Securities and Exchange Commission ("Commission", "SEC") made amendments to money market rule 2a-7, as stated in their official documents, "by replacing references to credit ratings, the amendments will, particularly when considered together with other amendments the Commission has adopted that remove credit ratings references in other rules and forms under the federal securities laws, contribute to the Dodd-Frank Act goals of reducing perceived government endorsement of NRSROs and overreliance on credit ratings by market participants."

Taking into consideration the market practices prior the amendments studied in this paper and the amendments to rule 2a-7 adopted in the 2014 Money Market Fund Adopting Release, the Commission predicts that a scenario where funds increase their exposure to riskier securities, although possible since funds are no longer bound to invest in first tier securities,

has a low probability of materialising. Although more supportive of a scenario where the amendments reduce the likelihood of an increased credit risk of portfolios, SEC raises arguments in favour of a movement to both directions, either towards an increase in preferences for less risky or towards more risky securities. Unable to select a clear path, it was not able to quantify the potential effects of the amendments.

Supporting a non-increase or eventually a reduction in exposure of funds to riskier securities, three main arguments were raised. First, money market funds, especially those that were rated, already presenting investment policies more restrictive than rule 2a-7 required, were not expected to change their investment behaviour after the amendments. Second, following the 2014 amendments to rule 2a-7, in summary SEC predicts that as long as investors value price stability, floating net asset value ("NAV") funds will strive to reduce NAV fluctuations, which consequently implies the selection of less volatile securities. Third, since for some funds the risk-adjusted return of investing in second tier securities may not surpass the cost of assessing if the security's credit risk complies with the new amendments, they may opt for top rated securities with higher probability of complying with the amendments and reduce demand for securities rated second tier.

On the other side, motivated by the fact that the amendments remove limitations on fund's investments in second tier securities, arguments favouring a potential increase in riskiness of portfolios were raised. The main argument on this side is based on a scenario where enough investors value yields more than price stability, which incentivises floating-NAV funds to increase the number of riskier securities in their portfolios. If this scenario materialises, two distinct risk and return profiles could emerge inside money market funds, where investors depending on their preferences (yield vs price stability) could choose from.

Concerning the future of rating agencies, SEC also points two possible future directions after the amendments. If the general demand for ratings decreases, rating agencies might invest less in producing credible and reliable ratings. In opposition, the removal of rating requirements may increase the incentives for rating agencies produce more reliable ratings to remain competitive.

The main objective of this work project is to study the specific case of money market funds to obtain evidence of the effects of removing rating-based regulation.

To conduct this study, the asset allocation preferences of the funds' holdings were analysed. It was required to collect detailed data about the characteristics of the funds' holdings, characteristics of the funds themselves and bond rating events. To these data, linear regression methods were applied to obtain insights about the funds' asset allocation preferences and consequently to infer about the possible existence of a variation in behaviour after the removal of rating-based regulation.

When interpreting the econometric results, it was possible to obtain the following evidence on the aftermath of the amendments. Considering all money market funds together, evidence of a change in asset allocation preferences towards securities perceived in the market as safer was observed. Additionally, the results present movements of preferences starting from an early stage of the amendment procedures. The behaviours of two types of money market funds were compared and was possible to verify more pronounced and well-defined movements also in the direction of safer holdings for funds of the prime type. However, for funds of the taxable type, movements were of smaller scale and sometimes pointing into different directions in terms of the perceived safeness of securities preferred by asset managers. Combining the movements of the two fund types, it was possible to find evidence of an approximation of characteristics preferred by fund managers from the two types when selecting securities. To

confirm if the variation of behaviour of money market funds were solely due to amendments to regulation targeted to them, similar procedures were applied to municipal bond holdings, where no similar movements were observed, confirming the suspicion at the beginning of the sentence.

From the above-mentioned results, it is possible to derive conclusions regarding the implications of removing rating-based regulation for money market funds and possibly extrapolate them for similar amendments for other types of funds. Although not possible to say for sure that the objectives behind the amendments of reducing reliance on credit ratings as a measure of credit risk were attained. It is possible to confirm that the scenario proposed by the SEC where funds' disciple increases and portfolios became less populated by riskier securities is the one that turns into reality. However, lower returns and a less clear distinction between types of money market funds when an investor is selecting funds followed.

## 2. Institutional details

«Section 939A of the Dodd-Frank Act requires each federal agency, to "review any regulation issued by such agency that requires the use of an assessment of the credit-worthiness of a security or money market instrument and any references to or requirements in such regulations regarding credit ratings", the Securities and Exchange Commission is adopting certain amendments, initially proposed in March 2011 and re-proposed in July 2014, related to the removal of credit rating references in rule 2a-7, the principal rule that governs money market funds» (SEC 2015). Prior the amendments, rule 2a-7 required "money market funds to invest only in securities that have received one of the two highest short-term credit ratings or, if they are not rated, securities that are of comparable quality. The rule also required a money market fund to invest at least 97 percent of its assets in securities that have received the highest short-term credit rating" (SEC press release 2015). After the amendments, the prior requirements

were eliminated and funds were bound to invest in securities that present minimal credit risk (individually and when considered at the portfolio level) after funds' own assessment. The main objective of these amendments is to prevent funds' overreliance on credit ratings and rating agencies, stimulating the funds' own assessment of risk and avoiding the potential systematic risk caused by a general miss-assessment of credit risk by rating agencies.

The rules were adopted and announced on September 16, 2015, became effective on October 26, 2015 and the compliance date was October 14, 2016. The main difference between effective and compliance date is that although after the 26th of October 2015 the amendments were present in the legislation ruling money market funds, only after the 14th of October 2016 was mandatory to comply with them and a penalty framework would be applied to funds not complying. This period of one year between those dates had the objective of providing "an adequate period of time for money market funds to review and revise their policies and procedures for complying with amended rule 2a-7" (SEC 2015). Since the announcement and effective date are only separated by slightly more than one month, the terms announcement and effective date will be used interchangeably throughout this paper to refer to dates between September and October 2015.

Taking into consideration the law amendments described before, this thesis will analyse the effects of removing rating-based regulation, being centred in testing hypotheses to solve the following four research questions:

**I.** Did the law amendments produce any effect on money market funds asset allocation preferences?

**II.** If effects were produced, did they happen at an earlier or later stage?

**III.** If effects were produced, were they the same for all types of money market funds or were they different?

**IV.** If money market funds present a change of behaviour, was it due to amendments targeted to them or was it a general debt market movement?

## 3. Literature Review

Although some concepts surrounding this paper were approached before by other authors, namely discussions about credit ratings and agencies, asset allocation preferences or changes in regulation of money market funds, to the best of my knowledge the core of this paper has not been analysed before. Being this core constituted by a specific amendment in money market funds legislations and forming this way a unique contribute to the literature on the effects of removing rating-based regulation.

In the paper "The Economics of Credit Rating Agencies", Francesco Sangiorgi and Chester Spatt "explore through both an economics and regulatory lens the frictions associated with credit rating agencies in the aftermath of the financial crisis". They balance the importance of credit ratings against the drawbacks such as being a source of systemic risk. Mention alternatives to ratings. Study the current payment method and possible alternatives. Assess the existing conflicts of interest. They also build a model to illustrate the feedback effect from ratings into the fundamental value of the asset that receives the rating. In their conclusions, although able to determine the imperfections and frictions of credit ratings highlighted by the financial crises, they left the effects in the industry from the Dodd-Frank act as an open question.

Even though with the Dodd-Frank act as the main propeller of the present paper and as central piece of the text above-mentioned, the two papers go in different directions in terms of scope. The paper mentioned in the paragraph above engages on a general discussion on the problematics of the credit rating agencies after the 2008 financial crises, while, in part due to

issues raised in similar discussions the current paper studies a particular case of an amendment to regulation specific to a type of debt market fund.

In the paper "Liability Structure and Risk-Taking: Evidence from the Money Market Fund Industry" from Ramin P. Baghai, Mariassunta Giannetti and Ivika Jäger a reform also on money market fund regulation is studied, taking place around the same dates as the amendments studied in this paper, being announced in July 2014 and becoming effective in October 2016. With the objective of increasing funds' stability and avoiding future runs, "prime and tax-exempt funds were allowed to impose redemption gates and liquidity fees. In addition, non-government funds marketed to institutional investors had to switch from constant to floating net asset value" (Baghai, Giannetti and Jäger 2020). The authors concluded that after the reform, the investors' flows into the affected funds became more sensitive to performance, inducing funds to take more risk. Consequently, they observed that the funding provided to the corporate sector, especially to safer issuers, experienced a decrease.

Although the mentioned paper has similarities to the present paper, both in terms of time-period and type of fund being the subject of study, it does not examine the same type of policy. In addition, the reform studied there is targeted to money market funds of the prime and non-taxable type, whereas in the present paper the law amendments are targeted to all money market funds.

Ramin P. Baghai, Bo Becker, and Stefan Pitschner in the paper "The Private Use of Credit Ratings: Evidence from Mutual Fund Investment Mandates" also motivated by the credit ratings' lack of capacity to measure credit risk verified during the 2008 financial crisis, study the effects of that evidence on mutual funds. The main difference here in comparison to the literature mentioned before is that this study uses evidence outside of the public regulation sphere. Using fixed income mutual funds' investment mandates as evidence, the authors

conclude that the private use of credit ratings, in opposition to what was expected, is still widespread and steadily increasing.

Although both papers deal with the use of ratings as a criterion in the selection process of holdings by fund managers, both are differentiated in terms of the type of funds studied. Additionally, in the paper described above the possible effects are studied just as a response to evidence from the market, whereas in the current paper the effects are not only studied as a response to the same evidence but also to amendments to the regulation of the funds studied.

## 4. Data Sources and Sample Construction

To conduct the analysis present in this paper, it was required data from several sources.

The detailed information of each individual bond holding of money market funds was originated from Morningstar, as well as the following money market fund characteristics: expense ratio, flow, return and size. The map to identify the holding type of each security and the data on the Morningstar fund classification were also provided by Morningstar.

Analogous data was retrieved for municipal bond funds from the same sources.

Bond rating events data was provided by Mergent Fixed Income Securities Database (FISD) at Warton Research Data Services. In addition, the one-month constant maturity treasury bill rate was obtained from the Federal Reserve Bank of St. Louis Economic Data (FRED).

To reach samples suitable for analysis a sequence of procedures was required.

After cleaning and tidying the data, since the raw rating events data only had observations at the exact date of a rating event, it was necessary to expand the data frame to fill it of ratings between event dates.

To be possible to use rating categories in econometric models, a table converting rating categories into integers was created. The table can convert Standard & Poor's, Moody's and Fitch ratings into a scale from 1 to 22, being 1 the best rating category (triple a) and 22 the worst (default).

After merging the money market holdings with the respective rating for each bond at each specific point in time, a variable containing the relative weight of each specific bond on the size of each fund at each point in time was created. To create this relative weight, the wight of each bond on the fund was divided by the sum of all contemporaneous bond weights available. The relative bond weight on the fund was used to calculate the contribution of the following bond characteristics, rating, coupon rate and time to maturity (in months) to the same characteristics at the fund level. Which by adding them, the fund's average rating level, coupon rate and time to maturity were obtained. In addition, the bond weight was used to compute the percentage of the fund holdings invested in government and cash securities. Using the fund average time to maturity, the variable percentage of fund holdings maturing within 6 months was created.

Two dummy variables concerning specific points in time were created. One for dates after the amendments becoming effective (October 26, 2015) in the legislation that rules money market funds, equalling one for observation months including and after November 2015. The other for dates after the mandatory compliance date (October 14, 2016), being equal to one for observation months including and after October 2016.

The corresponding Morningstar money market fund category was added to each fund in the holdings list. Morningstar divides money market funds in the following three categories: US fund money market taxable, US fund money market tax-free and US fund prime money market.

After adding the Morningstar money market fund categories, the following four fund characteristics, expense ratio, return, size and flow were also added to the fund list. For the particular case of the fund expense ratio, since only annual data is available, it was required to expand the data frame by applying the end of the year observation to the previous eleven months. Moreover, for the fund flow case, to turn the value of the flow in dollar terms into a fund flow in percentage terms, the fund flow was divided by the previous period fund size, both in dollar terms. This operation was done with the objective of enabling comparison between flows of funds with different sizes.

Finally, the one-month constant maturity treasury bill rate contemporaneous to the holdings observations was added to the funds' holdings list.

Analogous procedures to the ones mentioned so far in this section were done to the municipal bond funds' data. The only exception corresponds to the Morningstar categories. Since the categories attributed by Morningstar to municipal bond funds are not the same as to money market funds and for the sake of the current paper it was not necessary to distinguish between types of municipal funds, the Morningstar municipal fund categories were left out of the data treatment.

The summary statistics of the resulting samples from the previously mentioned procedures can be seen in **Table 1**.

As can be observed the data treatment resulted in a sample of 4245 fund observations for a 4-year time window centred at the mandatory compliance date versus a 4755 fund observations sample for a time window of equal length but centred at the date in which the amendments became effective in the money market funds' legislation. On the municipal bond funds side, a sample of 749 fund observations as resulted for dates centred at the mandatory

compliance date and for dates centred at the date in which amendments became effective a sample of 737 fund observations as resulted.

As can be noticeable one of the Morningstar money market fund categories is not present in the summary statistics panels. The reason for that to happen is mostly due to the lack of representability of the money market tax free fund type both before and after dealing with all the data. Since the number of observations was not meaningful and sufficient to be used in the incoming inference procedures, this fund type was left out of the samples.

Independently of the date at which the time window is centred it is possible to draw a clear distinction between the investment profile of the average money market fund and average municipal bond fund.

Starting by the average rating of the average fund, it can be observed that for money market funds most observations present a rating within the first three best rating classes. In opposition, municipal bond funds present an average rating around the $4^{th}$ and $5^{th}$ best rating classes, additionally can be found fund observations making use of most of the possible classes of the rating scale.

Concerning the average coupon rate of each fund holdings it is possible to observe an around 1.5 percentage points jump from money market to municipal bond funds, passing from about 0.75-0.91% to 2.23-2.48%.

Regarding time to maturity and percentage of holdings maturing within six months, municipal bond funds possess considerably larger times to maturity and lower percentage of holdings maturing in six months. The average time to maturity of money market holdings is around seven months, whereas for municipal bond holdings the number of months is around ten times larger.

The average percentage of holdings allocated to government and cash securities is slightly more than 80% for money market funds, while for municipal bond funds it is around half of that percentage.

For municipal bond funds it is possible to observe an average expense ratio about 0.4 percentage points above the average expense ratio for money market funds, being close to 1% and 0.6%, respectively.

Concerning average fund return, money market funds present a considerably lower value of 0.01% to 0.03%, compared to values around 0.08% to 0.11% for municipal bond funds. In addition, the returns from money market funds show way less volatility when compared to the ones from municipal bond funds.

It can also be observed a difference concerning the average size of the funds. While money market funds present an average fund size above eight billion, municipal bond funds present average sizes bellow 1.7 billion.

Although with around the same volatility for both fund types, the average fund flows for money market funds are centred at smaller values, bellow 0.15%, when compared to values above 0.32% for municipal bond funds.

When the previously assessed differences between fund types are analysed as an all, one can infer towards which direction fund managers from each fund type point fund holdings on average. In accordance with their mandate, money market fund holdings present, on average, a better rating class, lower coupon rate, lower time to maturity and higher percentage of holdings invested in government and cash securities in comparison to municipal bond holdings, characterizing a larger appetite from fund managers for securities with characteristics seen in the market as characteristics of safer securities.

Regarding the distribution of money market funds by Morningstar categories, it is possible to observe that for the time-period around the mandatory compliance date, 66% of the funds were of the taxable type versus 34% of the prime type. Whereas for the time-period around the effective date, 63% of funds were of the taxable type and 37% of the prime type.

Finally, one can observe that the earlier time window (centred at the effective date) was more characterised by a lower interest rate environment when compared to the later time window (centred at mandatory compliance date).

## 5. Methodology

Making use of the samples described in the previous section and taking into consideration the available variables, two blocks of variables were defined. Those directly dependent of the fund managers asset allocation, mostly characteristics of individual securities aggregated at the fund level were set on one side. Those less directly dependent or even independent of the managers' allocation decisions set on other side. The ones on the first block were understood as more prone to be influenced by amendments to money market funds' regulation, being consequently studied as dependent variables. Those variables were: fund holdings' average rating, coupon rate, time to maturity, percentage of holdings invested in government and cash securities and percentage of holdings maturing within six months. On the other side, the ones on the second block, more related with each fund individual mandate and management policy or even exogenous to money market funds and assumed not so directly influenced by amendments to money market funds' regulation, were used as control variables. Being those variables: fund expense ratio, return, size, flows and one-month constant maturity treasury bill rate.

The complete list of variables used in the regressions present on this paper and respective definitions can be seen on **Table 2**.

With the objective of assessing if there was shift of behaviour of money market funds after the mandatory compliance date of the amendments on the legislation, the dependent variables described above were regressed on the control variables also mentioned above. In addition, a variable of interest, a dummy equal to one for the observations dated after the compliance date was added to the regressions with the objective of assessing the effect of the rule amendments on the money market fund holdings asset allocation. In these regressions the 4245 fund observations sample with a 4-year time window centred at the mandatory compliance date was used. The results from these set of regressions can be observed in **Table 3**. Additionally, the equation that summarises the regressions described is the following:

$$DependentVariable_{i,t} = \beta_0 + \beta_1 \cdot Compliance_{i,t} + Controls_{i,t} + u_{i,t}, \quad (1)$$

where *i* denotes de fund and *t* the month.

Using the same sample and with the objective of evaluating if the response of funds was the same or different for both Morningstar money market fund types, two additional variables of interest were added to the previous set of regressions. The first was a dummy variable equal to one for the observations of the taxable fund type to account for differences (independently of the time-period) between the asset allocation preferences of the two fund types. The second was an interaction variable between the other two dummy variables, the post compliance date and the taxable fund type, to take into consideration potential differences of the effects of the rule amendments on the two fund types. The results from these set of regressions can be found in **Table 4** and the equation to whom the data is fitted is the following:

$$DependentVariable_{i,t} = \beta_0 + \beta_1 \cdot Compliance_{i,t} + \beta_2 \cdot Taxable_{i,t} + \beta_3 \cdot Compliance \cdot Taxable_{i,t} + Controls_{i,t} + u_{i,t}, \quad (2)$$

where *i* denotes de fund and *t* the month.

To assess if the effects of the amendments to money market rules on their asset allocation were more pronounced at an earlier stage, prior to the mandatory compliance date, both the sample and variables of interest were altered for the two sets of regressions described before. The sample used had 4755 fund observations for a time window of equal length to the one used before but centred at the date in which the amendments were announced and became effective in the money market funds' legislation. Moreover, the relevant date dummy variable of interest was altered for a variable that equals to one for the observations dated after the month when the amendments became effective in money market rules. Both prior sets of regressions were conducted taking into consideration the adjustments mentioned and can be viewed in **Tables 5 and 6**, respectively. The equations that summarise the regressions described are by the same order the following:

$$DependentVariable_{i,t} = \beta_0 + \beta_1 \cdot Effective_{i,t} + Controls_{i,t} + u_{i,t}, \quad (3)$$

$$DependentVariable_{i,t} = \beta_0 + \beta_1 \cdot Effective_{i,t} + \beta_2 \cdot Taxable_{i,t} + \beta_3 \cdot Effective \cdot Taxable_{i,t} + Controls_{i,t} + u_{i,t}, \quad (4)$$

where *i* denotes de fund and *t* the month.

With the purpose of determining if the movements of money market holdings were an isolated case in the debt market, pointing to a response to amendments targeted to them and not just a global movement on the debt market, two of the four sets of regressions described in this section so far were conducted for municipal bond funds data. The regression sets were the ones with the relevant date dummies but without specifying the fund type. The Morningstar fund types were not specified because, as explained before, the categories attributed by Morningstar to municipal bond funds are not the same as to money market funds, additionally including the Morningstar municipal bond funds categories was not relevant to solve the task in hands. For

the set of regressions with the compliance variable of interest, the sample with 749 fund observations was used and the results can be found in **Table 7**. In addition, in the set of regressions with the effective date of interest, a sample with 737 fund observations was used and the results can be observed in **Table 8**. The equations that characterize the regressions present in **Tables 7 and 8** respectively, are the following:

$$DependentVariable_{i,t} = \beta_0 + \beta_1 \cdot Compliance_{i,t} + Controls_{i,t} + u_{i,t}, \quad (5)$$

$$DependentVariable_{i,t} = \beta_0 + \beta_1 \cdot Effective_{i,t} + Controls_{i,t} + u_{i,t}, \quad (6)$$

where *i* denotes de fund and *t* the month.

Since the data delt in previous regressions was mostly a panel with several fund observations at each point in time and several observations of the same fund at different points in time, it was required to use other regression method than ordinary least squares to avoid misspecification of standard errors potentially conducting to erroneous inference. Used to estimate linear models with multiple group fixed effects and including support for robust and multi-way clustered standard errors, *"felm"* function from *"lfe"* package in R software environment "uses the Method of Alternating projections to sweep out multiple group effects from the normal equations before estimating the remaining coefficients with OLS" (Gaure 2020). By using this method and clustering standard errors by date and fund identification code, it is possible to produce robust standard errors and inference.

To attain a more visual and simplified perspective of what is being studied in this paper it was plotted the three months moving average for all funds, at each point in time weighted by fund sizes, of the variables studied in the previously described regressions. It was used a 5-year sample starting two years before the announcement date and ending two years after the mandatory compliance date. The plots can be observed in **Figure 1**, where in each panel a different variable is represented. Moreover, it is possible to observe three different lines in each

plot, the blue line concerns the money market funds as an all, the dark red/brown line represents only the cases of the prime Morningstar category and the green line the cases of the taxable category. It is also possible to detect two red vertical lines, where each one represents one of the dates of interest studied.

## 6. Results

### 6.1. Presentation of Results

Looking to **Table 3**, when analysing money market funds altogether, one can identify that three out of the five regressions present a statistically significant beta for the compliance dummy. On average, during the 4-year period around the compliance date, it was verified that the average coupon rate of the fund's holdings has decreased about 0.24% from the period before the mandatory compliance date to the period after. Additionally, by conducting the same analysis for the other two significant coefficients, it is possible to verify, on average, a decrease of average number of months to maturity and an increase of the percentage of holdings maturing within six months of 1.29 months and 5.24%, respectively. The betas of the compliance dummy are significant at the 1% significance level for the regressions with coupon rate and time to maturity as dependent variable and significant at the 5% significance level for the regression with the percentage of holdings maturing within six months as dependent variable. Moreover, the coupon rate regression, with an adjusted $R^2$ of 34.7% presents a better fit of the data compared with the other two regressions. Finally, concerning control variables, both return and one month treasury bill rate show significance in most of the regressions, in addition size also presents some significance in two regressions.

In **Table 4**, using the same sample as above but taking into consideration the distinction that Morningstar does of money market funds between the taxable and prime categories, it is

possible to observe a slight change of paradigm. Apart from the average coupon rate that just presents weak evidence, all the other asset allocation parameters studied present strong evidence of existing differences between the asset allocation preferences of the two fund categories independently of the time-period. On average, the holdings of the taxable type in comparison with the prime type are almost one rating class higher, present a 0.13 percentage points lower coupon rate, minus 2.65 months to maturity, more 32.44% are invested in government or cash securities and almost 10% more maturing within 6 months.

Concerning the prime fund category alone, the direction of the movement after the compliance date is similar to when considering all money market funds together, however both the size and significance as altered. For prime funds, the variable of interest for the average coupon rate is just significant at a 10% significance level and the percentage of holdings maturing within six months is now significant at a 1% significance level. In addition, after the compliance date, the decrease of the average coupon rate was lower (about 0.16%) comparing to all funds together, however the decrease of time to maturity and increase of holdings maturing within six months was higher, around 3.08 months and 12.89%, respectively.

In the taxable funds' case only two out of the five parameters studied present a significant movement post compliance date different from the prime movement post compliance date, those parameters are the holdings' average number of months until maturity and percentage of holdings maturing in six months. As can be observed the coefficient of the interaction dummy goes in the opposite direction to the coefficient of the compliance dummy alone in both cases. For average time to maturity the beta of the interaction dummy outweighs the beta of the compliance dummy by 2.8 months, resulting in an average decrease around 0.28 months for the taxable funds after the compliance date. Additionally, the movement for the percentage of holdings maturing in six months is lower by 11.83 percentage points for the

taxable type in comparison to the prime type, resulting in a net movement around 1.06% for the taxable type after the compliance date.

Regarding significance, all significant variables found before are significant at a 1% significance level, being the only exception the variables from the coupon rate regression that are significant just at a 10% significance level. Looking to control variables, the ones found with larger explaining power in the previous set of regressions remain the ones in this set of regressions. Finally, is possible to observe a larger adjusted $R^2$ for all regressions in comparison to the ones analysed before, suggesting a better fit of the data.

When analysing **Table 5**, one can see that for all money market funds together, when the variable of interest is the effective date, comparing to the compliance date, it loses significance in one regression but gains it in other two regressions. Additionally, for the coefficients with common significance for both dates, there are small differences in the amount of significance and size of the coefficients. Starting by the regressions where the variable of interest gained significance, one can conclude that on average, after the effective date, the average holdings' rating improved 0.38 ratings classes and the average percentage of holdings invested in government and cash securities increased by 11.01%. Moreover, both variables are significant at a 1% significance level. Passing to the average percentage of holdings maturing within six months regression, it is possible to observe a loss of significance for the variable of interest. Lastly, in the regressions where the variable of interest remained significant, it can be observed that in the average time to maturity regression, the coefficient of the variable of interest increased size (to 2.02 months), but in the average coupon rate regression the coefficient decreased size (to 0.11%) and slightly loss significance (now significant at a 5% significance level). Concerning control variables, a loss of explaining power compared to the homologous set regressions centred at the compliance date can be witnessed, where only return is significant in two regressions and treasury bill rate remained significant in the average coupon rate

regression. Finally, it is possible to realise that with the anticipation of the time window and variable of interest, there was an increase of the adjusted $R^2$ for the variables that remained and gained significance and a loss for the ones that completely or partially lost significance, suggesting an improvement and deterioration of the regressions' capacity to fit of the data, respectively.

In **Table 6**, using the same sample as in **Table 5** but separating money market funds by the two Morningstar categories, taxable and prime, it can be observed a change of scenario in comparison to both the case with the same sample but no separation by fund type (**Table 5**) and the case with separation by fund type but sample and variables of interest centred at mandatory compliance date (**Table 4**). As in **Table 4**, a clear distinction of asset allocation strategies (independently of the point in time in the sample) between the two fund types is present in four out of the five regressions, being the only exception the regression with average coupon rate of holdings as dependent variable. As can be observed in the coefficients of the taxable dummy, on average the holdings of the taxable type in comparison to the prime type, present a rating class about 1.2 classes higher, a time to maturity 6 months lower, a percentage of holdings invested in government and cash securities 37.68% higher and a percentage of holdings maturing within six months 18.82% higher.

Looking to prime funds alone it is possible to observe a significant change of behaviour in terms of asset allocation preferences in four out of the five characteristics analysed after the effective date. As it can be verified, on average, after the effective date the average holdings of prime funds improved their rating by 0.64 classes, the time to maturity decreased about 5.54 months, the percentage of holdings invested in government and cash securities increased 17.13% and the percentage of holdings maturing in six months went up 13.38%.

For taxable funds, significant movements after the effective date different from the ones from prime funds can be verified. In all four cases the interaction dummy outweighs the effective dummy alone, in two of them by less but in the other two by more, suggesting a movement in relation to prime funds of smaller dimension in the first case and in opposite direction in the second case. Starting by the movements of smaller dimension, on average, with an interaction dummy of 0.46 classes in the holdings' rating regression and -11.25% in the percentage of holdings invested in government and cash securities regression, the holdings of prime funds after the effective date witnessed a rating improvement around 0.18 classes and an increase of holdings invested in government and cash securities around 5.88%. Passing to the movements in opposite direction to the ones verified in prime funds, on average, in the regression with holdings' average time to maturity as dependent variable, with an opposing movement around 5.84 months, the number of months until maturity for taxable funds after the effective date increased by 0.3 months and in the regression with percentage of holdings maturing in six months as dependent variable, with an opposing effect of 18.43%, in net terms after the effective date, the percentage of holdings maturing in six months decreased 5.05%.

Concerning significance, all the significant variables of interest analysed are significant at a 1% significance level, being the only exception the interaction variable of the percentage of holdings invested in government and cash securities regression, which is only significant at a 5% significance level. Regarding the predictive power of controls, the pattern found in the previous set of regressions can also be found here, however the explaining power shifted from the return variable to the size variable with some loss of significance. Lastly, as happened from **Tables 3 to 4**, here from **Tables 5 to 6** with the addition of the fund types to the regressions it is possible to verify an increase in the adjusted $R^2$ for all regressions, suggesting an improvement of the models' capacity to fit the data.

Looking to **Table 7**, when analysing municipal bond funds, it is possible to verify that for the 4-year time window around the mandatory compliance date, only the regression with the average time to maturity of holdings as dependent variable presents a strongly significant (at 1% significance level) coefficient for the variable of interest. In addition, the regression with average rating class of holdings shows some weak significance (at 10% significance level) for the variable of interest. On average, after the mandatory compliance date, the average number of months until holdings mature increased around 80.18 months and the average rating class of holdings improved about 1.46 rating classes.

By observing **Table 8**, still analysing municipal bond funds but for a 4-year period centred at the effective date, it is possible to notice that only the regression with time to maturity as dependent variable present a coefficient for the variable of interest with some significance (at 10% significance level). On average, the funds holdings' average time to maturity increased by 72.27 months after the effective date.

When comparing the regressions for municipal bond funds in **Tables 7 and 8** with their homologous in terms of variables and time windows for money market funds, in **Tables 3 and 5**, respectively, one can verify that, apart from one case, the regressions for municipal bond funds present larger adjusted $R^2$. Since the explaining capacity of the variables of interest decreases from money market funds to municipal bond funds' regressions, one can infer that the better fit of the data shown by municipal bond funds' regressions derives from the capacity of the independent variables as an all to explain it.

Looking to the panels in **Figure 1**, in some cases faster in others with less velocity, it is possible, in general, to validate the same findings as in the tables with the sets of regressions. One thing that pops out of those plots is the larger fluctuation of the lines of the prime Morningstar category in comparison to the lines of the taxable category and a resulting line

(pulled by prime funds) for all money market funds together with fluctuations of intermediate size.

## 6.2. Results Discussion

When analysing the results mentioned so far in this section, it is possible to contemplate the following answers to the four research questions around which this paper was built. In addition, a connection with the predictions raised by the SEC can be made.

### 6.2.1. *All funds movement*

When analysing the funds altogether, a movement of asset allocation preferences towards what is generally perceived in the market as safer holdings can be observed. This conclusion comes from the generality of the studied fund holdings' characteristics pointing into that direction. On average, it is observed an improvement of the average fund holdings' rating and a decrease of average coupon rate and time to maturity. Also, it is observed a movement in direction of more government and cash proxy securities and securities maturing within 6 months.

### *6.2.2. Movement time-window*

The effects of the removal of references to credit ratings from the money market rules were more pronounced around the date where they became effective than around the mandatory compliance date. The models, in general, fit the data better in the first time-period. Additionally, although with few exceptions, there are more significant variables of interest, with higher

significance and larger coefficients. This evidence shows an effect on money market funds' holdings from the law amendments at an early stage.

### *6.2.3. Movement per fund type*

By including the fund type variable into the regressions, the models' predictable power increased considerably, suggesting a clear distinction in the characteristics of the holdings between the two money market fund types.

For the funds of the prime type with all the coefficients of the variable of interest pointing in the same direction, there is evidence of a sizable and well-defined movement after the amendments becoming effective. This movement, like the movement when considering all funds together, points asset allocation preferences towards securities perceived in the market as safer.

The holdings of the funds of the taxable type, were already more towards safer securities before both the effective and compliance date, as the coefficients of the taxable dummy suggest. Concerning the effects of the legislation amendments for this type of funds, when looking to the difference between the betas of the interaction dummy and the effective date dummy, although of small dimension, it is possible to verify movements in what can be considered opposing directions. The regressions where time until maturity is studied point into longer times to maturity and consequently more risky preferences. Conversely, the regressions studying the holdings' rating and percentage invested in cash and government securities shows evidence of preferences towards safer securities.

When considering the movements shown by both funds together, with a sizable well-defined movement for funds of the prime type into less risky securities and a smaller, not so well-defined movement (possibly also towards less risky securities) for funds of the taxable

type, it is possible to find evidence of an approximation of asset allocation preferences of fund managers from the two types of funds, more specifically, preferences of managers from prime funds going into the direction of preferences from managers of the taxable funds.

Another conclusion can be made for the case of funds holdings' average coupon rate. As the regressions suggest and in opposition to other characteristics studied, although there is some evidence of a movement after the dates studied, there is no evidence of significant difference between the two fund types.

#### *6.2.4. Market movement or policy outcome*

Although the time to maturity variable presents a strong significant coefficient around the compliance date and can also be found weak evidence for the same variable around the announcement date and for the ratings variable around the compliance date, the lack of a consistent message for the municipal bond funds in opposition to what can be observed for the money market funds case, constitutes evidence supporting that movements of money market fund holdings can be attributable to the amendments to regulation targeted to them.

#### **6.2.5.** *Connection with SEC predictions*

Although the study done in this paper allows to determine the effects of removing rating-based regulation mostly from an asset allocation perspective, it does not allow to say for sure if the main objective behind the amendments, of reducing funds' reliance on credit ratings, were attained. It is true that after the amendments, funds present a change of behaviour and being the amendments centred around credit ratings, with almost certainty one could argue that the way funds look to and use ratings as changed or at least if it did not change, it is possible to argue

that funds after the amendments started to rely more on additional factors to select securities. While some could argue that the generalised movement towards securities with characteristics other than ratings perceived as safer could constitute evidence of funds using other factors to select securities, others could argue that after the amendments funds stayed reliant on ratings and the general movement towards securities with characteristics other than ratings perceived as safer was just a movement towards better rating securities, where the other safer characteristics are just the ones from which better ratings are estimated. Consequently, just selecting securities based on ratings is enough to present a generalised movement towards securities with safer characteristics, but in reality the only criteria used by funds to select securities were credit ratings. To confirm or reject each of the opposing scenarios exposed in this paragraph, further procedures would be required, constituting a potential direction for future research.

Although not possible to determine if the main objective behind the amendments was attained, the study of asset allocation preferences allows to confirm which of the possible scenarios raised by the SEC concerning the riskiness of portfolios after the amendments materialised into reality. The movement towards securities perceived as safer constitutes evidence of a movement towards safer portfolios, supporting the three main arguments for this scenario. Funds that were already more restrictive in their investment mandates prior to the amendments studied here stayed the same, following the 2014 amendments investors kept favouring price stability over high yields and for some funds the cost of assessing the potential risk of less well-rated securities was too high, deciding to limit their investments to highly rated securities.

### 6.3. Directions for Future Research

Looking back to the work done in this paper until this point, it is possible to identify some points of improvement and potential directions for future research.

As mentioned in the previous subsection, the methods used in this paper were not sufficient to determine if the main objective of the amendments were attained. To solve this issue, in future research the reactivity of funds' holdings to rating events could be studied, where it would be compared before and after the amendments. If reactivity decreases after the amendments it would constitute evidence that the objectives were attained, conversely if it increases the opposite would have happened.

Although in the money market funds' case there were a considerable number of correspondences between holdings observations and rating events data available in Mergent FISD, a correspondence of the same dimension was not attained for municipal bond funds, where there was a significant loss in the number of observations when the holdings data was matched with rating events data. This lower correspondence resulted in a smaller sample for municipal bond funds in comparison to money market funds and potentially some loss of representability of the population. Consequently, when executing a similar paper or improving this one, it would be advisable to use additional data sources to obtain additional rating events data.

To test if there was a generalised movement in the debt market around the dates studied and the municipal bond funds were the exception and money market funds just followed that trend and were not actually responding to law amendments targeted to them, it would be interesting in future research to study other fund types inside the US debt market. By doing that, if the other fund types present the same behaviour as municipal bond funds present when

compared to money market funds, the theory stating that money market funds were responding to amendments target to them would be reinforced.

With the objective of testing if the observed movement for the US money market funds was specific to the US, the place where the amendments took place or if it instead were a generalised movement observed for other money market funds around the world, it would be interesting to extend the current investigation to other jurisdictions with developed debt markets. If the funds from other jurisdictions do not present significant movements around the dates studied, it would constitute an argument favouring again that the US money market funds were solely reacting to law amendments targeted to them. On the other side, if both US and outside US money market funds produce similar results, the theory of a generalised movement in the money market would gain support.

Still on future work involving other jurisdictions, but in this case targeting the ones where similar law amendments happened to money market funds at some point, it would constitute work in the direction of testing if the money market funds outside the US also got affected after the law amendments and if so, test if the direction of the effects were similar or different from the US case.

Finally, it would also be interesting to extend the current research to preferences regarding other characteristics of money market funds that are potentially prone to be affect by the law amendments.

## 7. Conclusion

Trough the course of this work project the effect of removing rating-based regulation was studied using as case of study the 2015 SEC removal of references to credit ratings in money market fund rule 2a-7. Linear regressions methods were used to study asset allocation

preferences of fund managers. As empirical evidence suggests, a general movement of fund holdings towards securities perceived as safer was observed. In addition, an approximation of the profiles of securities present in the holdings of both money market fund types studied (taxable and prime) was found. Finally, it was verified that the amendments affected money market funds at an early stage and that these effects were solely a result of regulation adjustments targeted to them and not of a general movement in the debt market.

To conclude, although not possible to determine if the objectives of the amendments were attained, it is possible to derive potential future implications. On one side, it was possible to verify an increase of discipline of fund managers when selecting securities. On the other side, the general movement towards safer holdings and a smaller spread in terms of riskiness between money market funds types will imply smaller returns from money market funds as an all and the absence of a well-defined riskier, higher return, alternative inside money market funds, respectively.

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## 9. Appendices

### Table 1: Summary Statistics

**Panel A:** Money market, 4-year window centred at compliance date

| | n | mean | sd | min | max |
|---|---|---|---|---|---|
| Compliance | 4,245 | 0.43 | 0.50 | 0 | 1 |
| Rating | 4,245 | 1.47 | 1.00 | 1 | 10 |
| Coupon_Rate | 4,245 | 0.91 | 0.66 | 0 | 5.50 |
| Time_To_Maturity | 4,245 | 6.63 | 4.46 | 0 | 51 |
| Share_Gov_Cash | 4,245 | 85.77 | 31.09 | 0 | 100 |
| Share_6M | 4,245 | 62.61 | 26.56 | 0 | 100 |
| Taxable | 4,245 | 0.66 | 0.47 | 0 | 1 |
| Prime | 4,245 | 0.34 | 0.47 | 0 | 1 |
| Expense_Ratio | 4,245 | 0.61 | 0.33 | 0 | 3.60 |
| Return | 4,245 | 0.03 | 0.04 | -0.03 | 0.24 |
| Size (in Billions) | 4,245 | 8.94 | 19.37 | 0.0003 | 165.61 |
| Flow | 4,245 | 0.15 | 9.78 | -86.14 | 393.34 |
| GS1M | 4,245 | 0.53 | 0.62 | 0.01 | 2.04 |

**Panel B:** Money market, 4-year window centred at effective date

| | n | mean | sd | min | max |
|---|---|---|---|---|---|
| Effective | 4,755 | 0.43 | 0.50 | 0 | 1 |
| Rating | 4,755 | 1.57 | 1.04 | 1 | 6 |
| Coupon_Rate | 4,755 | 0.75 | 0.66 | 0 | 6.22 |
| Time_To_Maturity | 4,755 | 6.99 | 6.67 | 0 | 65.53 |
| Share_Gov_Cash | 4,755 | 82.63 | 32.41 | 0 | 100 |
| Share_6M | 4,755 | 64.75 | 27.24 | 0 | 100 |
| Taxable | 4,755 | 0.63 | 0.48 | 0 | 1 |
| Prime | 4,755 | 0.37 | 0.48 | 0 | 1 |
| Expense_Ratio | 4,755 | 0.61 | 0.34 | 0 | 2.99 |
| Return | 4,755 | 0.01 | 0.02 | -0.03 | 0.24 |
| Size (in Billions) | 4,755 | 8.08 | 17.17 | 0.0003 | 165.61 |
| Flow | 4,755 | 0.08 | 9.48 | -89.02 | 393.34 |
| GS1M | 4,755 | 0.21 | 0.29 | 0.01 | 1 |

**Panel C:** Municipal bond, 4-year window centred at compliance date

| | n | mean | sd | min | max |
|---|---|---|---|---|---|
| Compliance | 749 | 0.48 | 0.50 | 0 | 1 |
| Rating | 749 | 4.59 | 3.58 | 1 | 21 |
| Coupon_Rate | 749 | 2.48 | 1.65 | 0 | 10.50 |
| Time_To_Maturity | 749 | 88.76 | 155.89 | 1 | 1,201 |
| Share_Gov_Cash | 749 | 41.11 | 46.12 | 0 | 100 |
| Share_6M | 749 | 21.52 | 36.12 | 0 | 100 |
| Expense_Ratio | 749 | 0.98 | 0.55 | 0 | 4.33 |
| Return | 749 | 0.08 | 0.81 | -6.09 | 2.02 |
| Size (in Billions) | 749 | 1.65 | 2.20 | 0.001 | 12.38 |
| Flow | 749 | 0.64 | 8.58 | -26.71 | 189.98 |
| GS1M | 749 | 0.56 | 0.61 | 0.01 | 2.04 |

**Panel D:** Municipal bond, 4-year window centred at effective date

| | n | mean | sd | min | max |
|---|---|---|---|---|---|
| Effective | 737 | 0.58 | 0.49 | 0 | 1 |
| Rating | 737 | 4.47 | 3.38 | 1 | 21 |
| Coupon_Rate | 737 | 2.23 | 1.58 | 0 | 7.25 |
| Time_To_Maturity | 737 | 67.79 | 148.32 | 1 | 1,201 |
| Share_Gov_Cash | 737 | 40.31 | 45.25 | 0 | 100 |
| Share_6M | 737 | 25.69 | 37.68 | 0 | 100 |
| Expense_Ratio | 737 | 0.99 | 0.66 | 0 | 4.33 |
| Return | 737 | 0.11 | 0.81 | -6.09 | 2.02 |
| Size (in Billions) | 737 | 1.49 | 2.06 | 0.001 | 12.38 |
| Flow | 737 | 0.32 | 9.39 | -97.33 | 189.98 |
| GS1M | 737 | 0.26 | 0.30 | 0.01 | 1 |

**Table 2: Variable Definitions**

| Variable | Definition |
|---|---|
| Rating | Fund holdings' average rating |
| Coupon_Rate | Fund holdings' average coupon rate |
| Time_To_Maturity | Fund holdings' average time to maturity (in months) |
| Share_Gov_Cash | Fund holdings' average percentage invested in government and cash securities |
| Share_6M | Fund holdings' average percentage maturing within six months |
| Compliance | Dummy variable equal to one for observations dated after the compliance date |
| Effective | Dummy variable equal to one for observations dated after the effective date |
| Taxable | Dummy variable equal to one for observations of the money market funds of the taxable type |
| Compliance:Taxable | Interaction dummy variable equal to one for observations of the money market funds of the taxable type and dated after the compliance date |
| Effective:Taxable | Interaction dummy variable equal to one for observations of the money market funds of the taxable type and dated after the effective date |
| Expense_Ratio | Funds' expense ratio |
| Return | Funds' return (in percentage) |
| log(Size) | Natural logarithm of Funds' Size |
| Flow | Funds' flow, money put in or pulled out of the funds by investors divided by the previous period fund size |
| GS1M | One-month constant maturity treasury bill rate |

**Table 3: Asset Allocation Preferences Regressed on Compliance Date and Controls (All Money Market Funds)**

| | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
| | Rating | Coupon_Rate | Time_To_Maturity | Share_Gov_Cash | Share_6M |
| | (1) | (2) | (3) | (4) | (5) |
| Compliance | -0.082 | -0.236*** | -1.287*** | 2.206 | 5.243** |
| | (0.120) | (0.060) | (0.346) | (3.750) | (2.170) |
| Expense_Ratio | 0.243 | 0.038 | 0.459 | -7.125 | -4.131 |
| | (0.191) | (0.078) | (0.659) | (5.547) | (4.565) |
| Return | 6.279*** | 2.261** | 12.919* | -216.066*** | -75.360 |
| | (2.309) | (0.905) | (6.625) | (74.546) | (56.463) |
| log(Size) | 0.014 | 0.027* | 0.172** | -0.709 | -0.566 |
| | (0.029) | (0.014) | (0.087) | (0.922) | (0.565) |
| Flow | -0.001 | 0.001 | -0.001 | 0.042 | 0.014 |
| | (0.001) | (0.001) | (0.005) | (0.026) | (0.026) |
| GS1M | -0.521*** | 0.621*** | 0.017 | 18.478*** | -2.246 |
| | (0.185) | (0.076) | (0.490) | (5.764) | (3.995) |
| Constant | 1.157* | 0.026 | 2.888 | 100.338*** | 78.157*** |
| | (0.626) | (0.317) | (2.027) | (19.444) | (13.090) |
| Observations | 4,245 | 4,245 | 4,245 | 4,245 | 4,245 |
| $R^2$ | 0.031 | 0.348 | 0.017 | 0.038 | 0.016 |
| Adjusted $R^2$ | 0.030 | 0.347 | 0.016 | 0.037 | 0.015 |
| *Note:* | | | | | *p**p***p<0.01 |

**Table 4: Asset Allocation Preferences Regressed on Compliance Date and Controls**

**(With Money Market Fund Type Specification)**

| | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
| | Rating | Coupon_Rate | Time_To_Maturity | Share_Gov_Cash | Share_6M |
| | (1) | (2) | (3) | (4) | (5) |
| Compliance | -0.090 | -0.164* | -3.084*** | 4.746 | 12.889*** |
| | (0.236) | (0.093) | (0.845) | (7.078) | (4.072) |
| Taxable | -0.945*** | -0.131* | -2.654*** | 32.439*** | 9.887*** |
| | (0.154) | (0.071) | (0.872) | (5.021) | (3.558) |
| Compliance:Taxable | 0.050 | -0.102 | 2.794*** | -5.107 | -11.830*** |
| | (0.246) | (0.084) | (0.919) | (6.964) | (4.437) |
| Expense_Ratio | 0.267 | 0.039 | 0.578 | -8.014* | -4.601 |
| | (0.168) | (0.079) | (0.608) | (4.870) | (4.428) |
| Return | 4.451* | 1.876** | 11.041* | -157.479* | -70.110 |
| | (2.423) | (0.858) | (6.313) | (81.610) | (54.779) |
| log(Size) | 0.042 | 0.033** | 0.180** | -1.569* | -0.560 |
| | (0.026) | (0.014) | (0.088) | (0.831) | (0.561) |
| Flow | 0.0001 | 0.001 | 0.002 | 0.003 | -0.001 |
| | (0.001) | (0.001) | (0.005) | (0.024) | (0.025) |
| GS1M | -0.360* | 0.655*** | 0.169 | 13.340** | -2.649 |
| | (0.185) | (0.072) | (0.464) | (5.829) | (3.922) |
| Constant | 1.133** | -0.037 | 4.278** | 99.292*** | 72.195*** |
| | (0.569) | (0.321) | (2.102) | (17.879) | (12.739) |
| Observations | 4,245 | 4,245 | 4,245 | 4,245 | 4,245 |
| $R^2$ | 0.218 | 0.364 | 0.065 | 0.247 | 0.035 |
| Adjusted $R^2$ | 0.217 | 0.362 | 0.063 | 0.246 | 0.033 |
| *Note:* | | | | | *p**p***p<0.01 |

**Table 5: Asset Allocation Preferences Regressed on Effective Date and Controls (All Money Market Funds)**

| | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
| | Rating | Coupon_Rate | Time_To_Maturity | Share_Gov_Cash | Share_6M |
| | (1) | (2) | (3) | (4) | (5) |
| Effective | -0.376*** | -0.114** | -2.024*** | 11.009*** | 2.261 |
| | (0.088) | (0.057) | (0.613) | (2.864) | (2.501) |
| Expense_Ratio | 0.082 | -0.039 | 0.475 | -2.669 | -4.591 |
| | (0.182) | (0.094) | (0.949) | (5.556) | (4.802) |
| Return | 5.586** | 1.792 | 3.822 | -192.451** | -43.375 |
| | (2.710) | (1.229) | (9.687) | (90.267) | (65.809) |
| log(Size) | 0.019 | 0.017 | 0.246 | -0.978 | -0.635 |
| | (0.030) | (0.020) | (0.167) | (0.965) | (0.676) |
| Flow | -0.001 | 0.0004 | 0.0004 | 0.027 | 0.010 |
| | (0.001) | (0.001) | (0.007) | (0.026) | (0.034) |
| GS1M | -0.291 | 0.321*** | -0.251 | 10.333 | 2.912 |
| | (0.187) | (0.092) | (0.687) | (6.290) | (5.068) |
| Constant | 1.296* | 0.371 | 2.382 | 99.720*** | 79.812*** |
| | (0.666) | (0.442) | (3.676) | (21.217) | (15.761) |
| Observations | 4,755 | 4,755 | 4,755 | 4,755 | 4,755 |
| $R^2$ | 0.042 | 0.022 | 0.028 | 0.042 | 0.006 |
| Adjusted $R^2$ | 0.041 | 0.020 | 0.026 | 0.041 | 0.005 |
| *Note:* | | | | | *p**p***p<0.01 |

**Table 6: Asset Allocation Preferences Regressed on Effective Date and Controls (With Money Market Fund Type Specification)**

| | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
| | Rating | Coupon_Rate | Time_To_Maturity | Share_Gov_Cash | Share_6M |
| | (1) | (2) | (3) | (4) | (5) |
| Effective | -0.635*** | -0.077 | -5.542*** | 17.132*** | 13.378*** |
| | (0.155) | (0.095) | (1.331) | (4.891) | (3.913) |
| Taxable | -1.203*** | -0.152 | -6.002*** | 37.678*** | 18.815*** |
| | (0.151) | (0.098) | (1.316) | (4.555) | (3.444) |
| Effective:Taxable | 0.460*** | -0.052 | 5.835*** | -11.251** | -18.431*** |
| | (0.178) | (0.104) | (1.333) | (5.390) | (4.158) |
| Expense_Ratio | 0.135 | -0.034 | 0.776 | -4.288 | -5.536 |
| | (0.150) | (0.095) | (0.852) | (4.516) | (4.506) |
| Return | 3.127 | 1.124 | 2.969 | -105.311 | -41.151 |
| | (2.779) | (1.154) | (8.965) | (94.746) | (62.136) |
| log(Size) | 0.031 | 0.020 | 0.262* | -1.410* | -0.683 |
| | (0.025) | (0.019) | (0.159) | (0.813) | (0.651) |
| Flow | 0.0003 | 0.001 | 0.0003 | -0.005 | 0.011 |
| | (0.001) | (0.001) | (0.006) | (0.023) | (0.031) |
| GS1M | -0.120 | 0.367*** | -0.192 | 4.278 | 2.761 |
| | (0.184) | (0.086) | (0.653) | (6.125) | (4.939) |
| Constant | 1.724*** | 0.394 | 5.484 | 87.188*** | 70.052*** |
| | (0.580) | (0.453) | (3.541) | (18.534) | (15.140) |
| Observations | 4,755 | 4,755 | 4,755 | 4,755 | 4,755 |
| $R^2$ | 0.271 | 0.038 | 0.138 | 0.288 | 0.071 |
| Adjusted $R^2$ | 0.270 | 0.036 | 0.137 | 0.286 | 0.070 |
| *Note:* | | | | | *p **p ***p<0.01 |

**Table 7: Asset Allocation Preferences Regressed on Compliance Date and Controls (Municipal Bond Funds)**

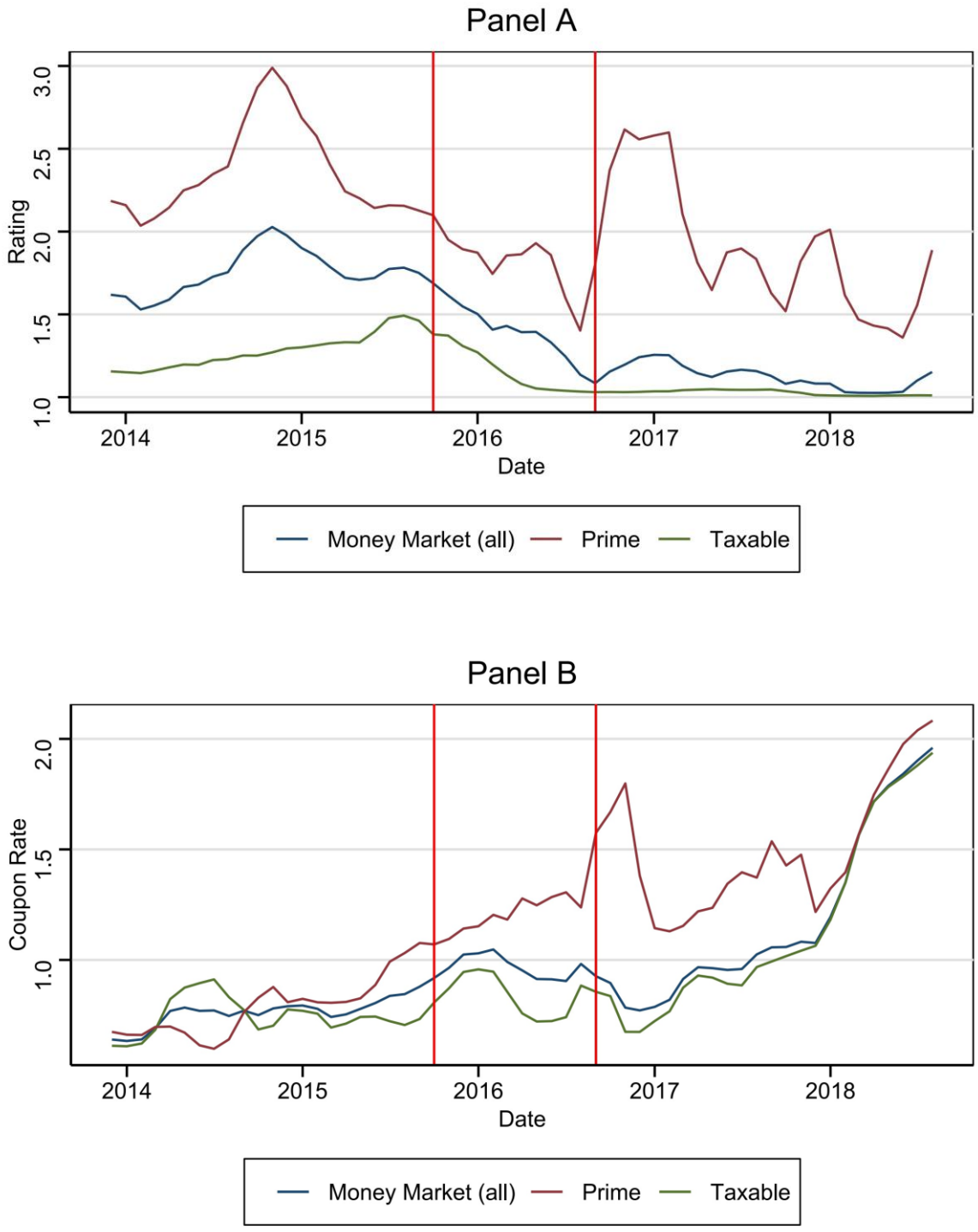
| | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
| | Rating | Coupon_Rate | Time_To_Maturity | Share_Gov_Cash | Share_6M |
| | (1) | (2) | (3) | (4) | (5) |
| Compliance | -1.458* | 0.169 | 80.181*** | 14.013 | -6.684 |
| | (0.794) | (0.310) | (20.249) | (10.105) | (7.326) |
| Expense_Ratio | 0.430 | 0.364 | -15.650 | 4.816 | -14.166* |
| | (0.755) | (0.324) | (22.334) | (8.220) | (7.546) |
| Return | 0.114 | 0.123 | 8.881 | -0.634 | -2.472* |
| | (0.132) | (0.104) | (11.683) | (2.464) | (1.291) |
| log(Size) | -0.357 | -0.042 | 9.534 | 7.263** | 0.413 |
| | (0.235) | (0.120) | (11.612) | (2.842) | (2.089) |
| Flow | -0.010 | 0.010 | 0.407 | 0.157 | -0.120 |
| | (0.021) | (0.011) | (0.409) | (0.300) | (0.114) |
| GS1M | 0.754 | 0.756*** | -5.156 | -3.796 | -14.656** |
| | (0.654) | (0.240) | (17.463) | (7.165) | (6.605) |
| Constant | 11.611** | 2.441 | -124.190 | -114.311* | 38.818 |
| | (5.137) | (2.610) | (247.526) | (59.934) | (43.443) |
| Observations | 749 | 749 | 749 | 749 | 749 |
| $R^2$ | 0.066 | 0.132 | 0.080 | 0.086 | 0.161 |
| Adjusted $R^2$ | 0.058 | 0.125 | 0.073 | 0.079 | 0.155 |
| *Note:* | | | | | *p **p ***p<0.01 |

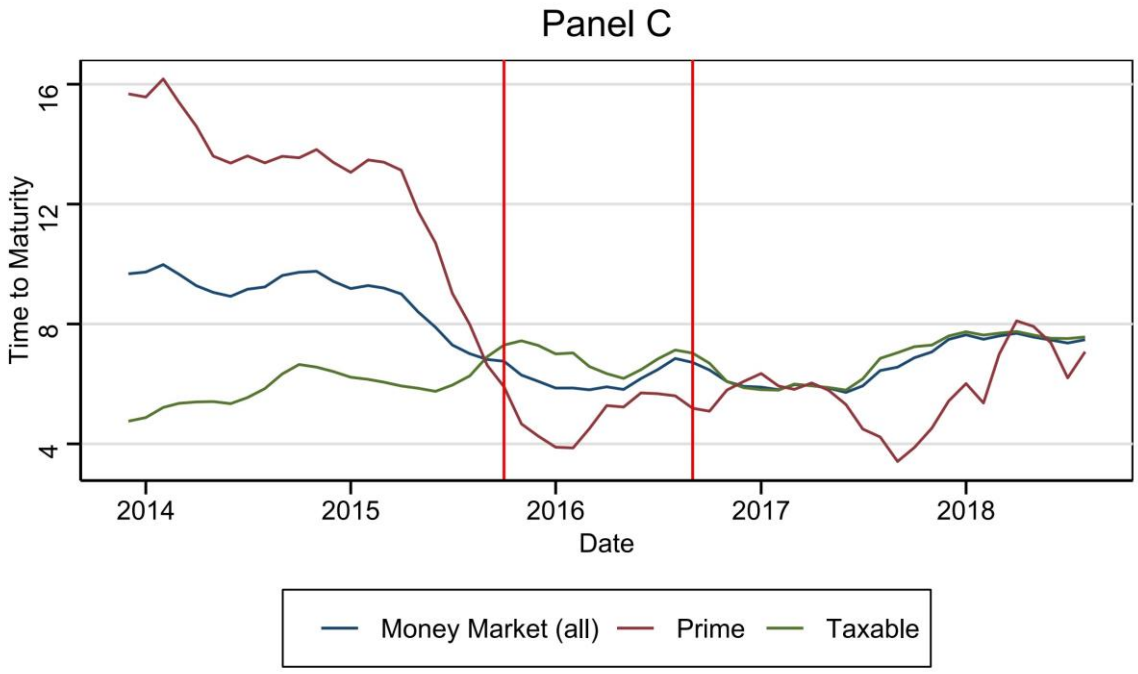
**Table 8: Asset Allocation Preferences Regressed on Effective Date and Controls**

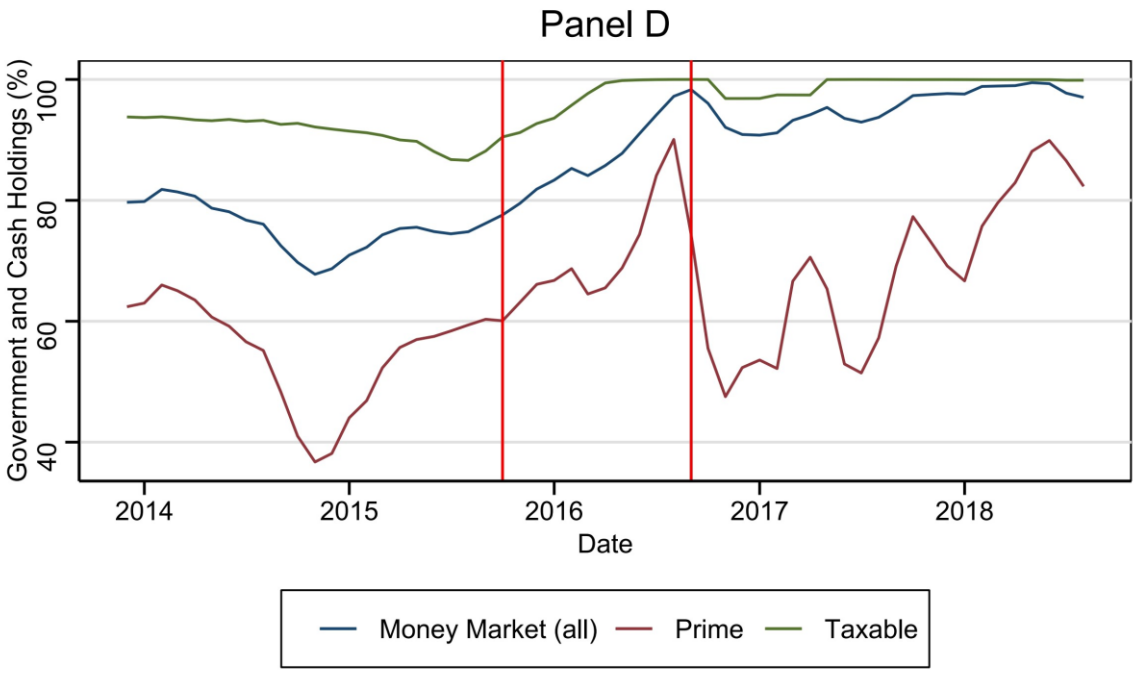
**(Municipal Bond Funds)**

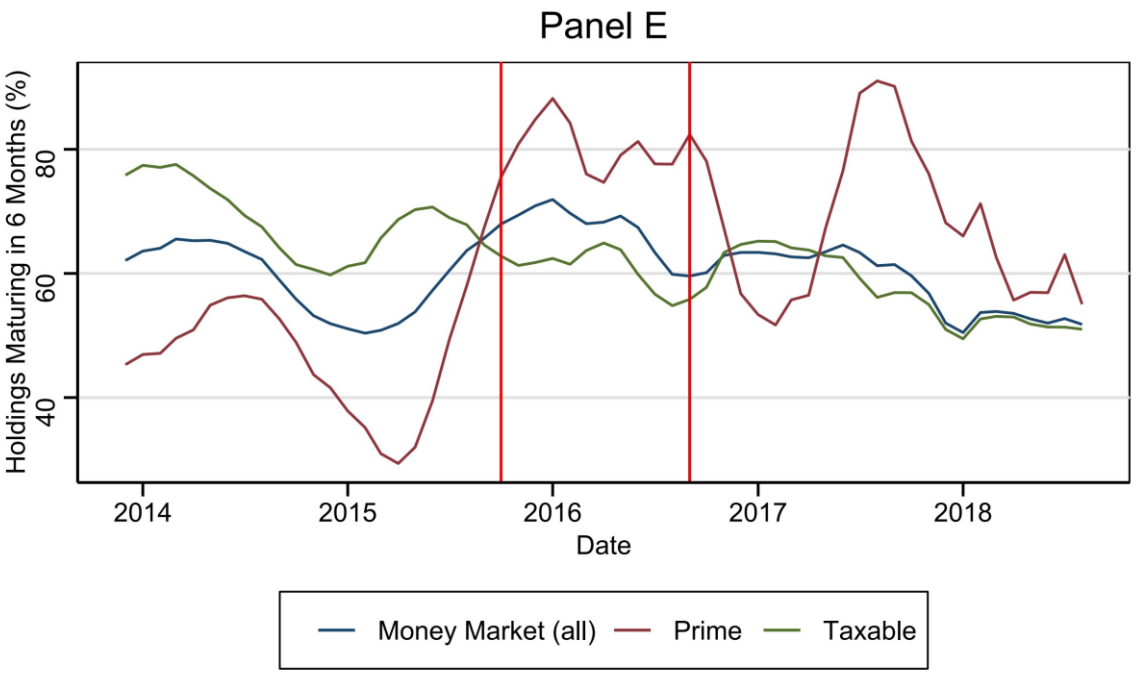
| | *Dependent variable:* | | | | |
|---|---|---|---|---|---|
| | Rating | Coupon_Rate | Time_To_Maturity | Share_Gov_Cash | Share_6M |
| | (1) | (2) | (3) | (4) | (5) |
| Effective | 0.307 | 0.075 | 72.265* | -1.355 | -1.910 |
| | (0.827) | (0.321) | (38.934) | (9.794) | (7.098) |
| Expense_Ratio | 0.497 | 0.493** | -12.015 | 2.103 | -13.346* |
| | (0.651) | (0.249) | (15.703) | (8.553) | (7.112) |
| Return | 0.275* | 0.104 | -1.786 | -1.166 | -1.395 |
| | (0.154) | (0.109) | (10.692) | (1.757) | (1.284) |
| log(Size) | -0.130 | 0.014 | 1.961 | 4.770 | 1.207 |
| | (0.225) | (0.110) | (10.190) | (2.986) | (2.582) |
| Flow | 0.002 | 0.006 | -0.281 | 0.089 | -0.006 |
| | (0.015) | (0.010) | (0.302) | (0.243) | (0.117) |
| GS1M | -2.773*** | 0.684 | 33.579 | 31.960** | -32.244*** |
| | (1.047) | (0.420) | (37.490) | (12.705) | (7.255) |
| Constant | 7.094 | 1.231 | -9.758 | -64.588 | 24.437 |
| | (5.018) | (2.371) | (211.568) | (64.402) | (52.683) |
| Observations | 737 | 737 | 737 | 737 | 737 |
| $R^2$ | 0.071 | 0.070 | 0.091 | 0.081 | 0.139 |
| Adjusted $R^2$ | 0.063 | 0.062 | 0.084 | 0.073 | 0.132 |
| *Note:* | | | | | *p**p***p<0.01 |

**Figure 1: Three Months Moving Average, Weighted by Fund Sizes, Asset Allocation Preferences at Each Point in Time (All Money Market Funds and Money Market Fund Type Specification)**




Panel C
Time to Maturity
4
8
12
16
2014
2015
2016
2017
2018
Date
Money Market (all)
Prime
Taxable


Panel D
Government and Cash Holdings (%)
40
60
80
100
2014
2015
2016
2017
2018
Date
Money Market (all)
Prime
Taxable


Panel E
Holdings Maturing in 6 Months (%)
40
60
80
2014
2015
2016
2017
2018
Date
Money Market (all)
Prime
Taxable